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⑦③ Proprietor: **C.R. BARD, INC.**  
**730 Central Avenue**  
**Murray Hill New Jersey 07974(US)**

⑦② Inventor: **Lindgren, Per Gunnar**  
**Grabergsvägen 24A**  
**S-752 40 Uppsala(SE)**

⑦④ Representative: **Lindgren, Anders et al**  
**Dr. Ludwig Brann Patentbyrå AB P.O. Box**  
**17192**  
**S-104 62 Stockholm (SE)**

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## Descripti n

### Field of the invention

The present invention relates to a device for tissue sampling by means of what is generally termed thick needle punctuation. In particular the invention relates to a device for propelling and operating a needle assembly, used for such sampling.

### Background to the invention

Sampling of inner tissue on humans and animals, so called biopsy, has become increasingly common. Using thick needle punctuation one can for example take out samples from deeply located organs, such as the liver or the kidneys. This kind of sampling, which is a very mild treatment, is usually carried in such a way that a doctor inserts a needle assembly through the skin and to the desired sampling location. The needle assembly comprises a hollow outer needle and a therewithin slidably provided inner needle. The inner needle has a pointed front portion, and is near the point provided with a hollow for receiving the tissue sample. The sampling itself is carried out in such a way that the inner needle is first pressed slightly inwards from the initial position, such that the surrounding tissue expands into the hollow provided in the inner needle. Thereafter the hollow outer needle is pushed forward to cover the inner needle thus cutting out a tissue sample, which thereby is collected in the hollow provided in the inner needle, and retained by the surrounding outer needle. Then the entire needle assembly containing the collected tissue sample is withdrawn, whereafter the sample can be taken out and analyzed. The sampling procedure is commonly monitored using ultra sonic equipment, to ensure the sampling is carried out correctly.

Such sampling is mostly carried out completely manually, demanding that two doctors participate, one of whom operates the ultra sonic equipment, and the other carrying out the sampling, i.e. a very work intensive procedure. In addition the sampling demands great skill and precision when handling the needle assembly, especially for coordinating the movements of the two needles, such that the entire needle assembly is first brought to the desired initial position, whereafter the inner needle is pushed forward and finally that the outer needle is moved forward over the inner needle, simultaneously cutting off the tissue sample. It can easily happen that the inner needle inadvertently is withdrawn during the cutting phase, with the consequence that none or too small an amount of tissue is collected in the hollow in the inner needle.

Thus there is a great need for biopsy devices, demanding the participation of just one doctor, and enhancing the security when operating the needle assembly. An attempt to solve this problem is described in SE-A-8202061-1 (WO-A-8303343), with the same applicants as the present application, the inventive idea of which resides in placing the needle assembly in a box, in which box there are provided propelling means for propelling the outer and inner needles, such that they carry out the above mentioned coordinated movements when the needle assembly has been located to the correct sampling position in the body. The needles are brought to carry out the desired movements in that the operator actuates a release mechanism outside of the box.

This known device constituted a great technical progress, since it made possible both one-hand operation during sampling (the doctor could manipulate the ultra sonic equipment with one hand and the sampling device with the other hand), and also enhanced security and precision when sampling (the relative movements of the needles were automatically controlled by the device). In spite of this the known device has shown several drawbacks. Among other things it has certain deficiencies regarding stability, and the procedures for placing the propelling means for the needles under tension and for loading the needle assembly, are relatively complicated and are being carried out in separate steps, whereby the propelling means must be tightened manually or with the aid of special tools. Further, the known device is deficient concerning security (e.g. there is a risk for inadvertent release of the device), and guiding of the needle assembly.

EP-A2-0 153 047 discloses a biopsy needle suitable for obtaining a core sample from a prostate gland. A handle 14 which may be held in the palm of the physician's hand is provided with a forward extending guide tube 30. A cannula 20 with a sharpened distal end is slidably disposed within the guide tube and is movable by a thumb tab from a retracted position within the guide tube, to an extended position in which the cutting edge extends from the guide tube. A sampling stylet having a sharpened distal end and a sample-collecting slot therein is telescopically disposed within the cannula and projects from the rear of the handle. The preferred embodiment of the disclosed device is entirely hand operated, in that the physician manipulates the cannula and stylet without any mechanism. In an alternate embodiment the physician manipulates the stylet without any mechanism and retracts the cannula without any mechanism, and a release mechanism is disclosed which is actuated to permit a spring to advance the cannula automatically.

### Object of the invention

The object of the invention is to provide an improved tissue sampling device of the type described, which device is better than previously known devices, and fulfills the demands that in practice are placed on this type of devices. Another object of the invention is to provide such a device, being simpler and safer to load, to operate and to release than previously known devices of this kind. A special object according to a preferred embodiment of the invention is to provide a tissue sampling device of said type, which device is more stable and has a longer life. A further object of the invention according to a preferred embodiment is to enhance security in this said type of tissue sampling device, especially by making possible simple control of whether the device is loaded or not, to prevent inadvertent release of the loaded device, and to prevent undesired rotation of the needle assembly.

These and other objects are achieved with the present invention as defined in claim 1, and will be apparent from the following description of preferred embodiments of the invention, whereby special features of said embodiments are disclosed in the dependent claims.

### Brief description of the drawings

In the drawings:

Figs. 1A-1C show schematic top views of a tissue sampling device according to the invention comprising a needle assembly, said assembly being shown in three different positions during sampling.

Fig. 2 shows a top view of a preferred embodiment of the tissue sampling device according to the invention, partly broken away, and

Fig. 3 shows a longitudinal sectional view of the tissue sampling device according to Fig. 2.

### Description of preferred embodiments

In the following a detailed description of some at present preferred embodiments of the invention will be given with reference to the drawings. However, the invention is not to be considered as restricted to these embodiments, but many modifications and variations can be made within the scope of the following patent claims.

Figs. 1A-1C schematically show how a needle assembly 1 is prepared for and manipulated for tissue sampling with the device according to the invention. The needle assembly 1 comprises a hollow outer needle 2 and an inner needle 3. The needles 2, 3 are pointed at one end, and the inner needle 3 is also provided with a hollow 3b at the

point, for receiving the sample. At the opposite end the needles 2, 3 are provided with heads 2a and 3a respectively, for mounting within the sampling device according to the invention, which is generally designated with 4. In this schematically shown embodiment, the device 4 comprises a box-shaped housing 5, comprising side walls 5a and 5b, as well as front and rear end walls 5c, 5d. A front slide 6 and a rear slide 7 are slidably provided in the longitudinal direction of the housing 5. Each slide 6 and 7 respectively is being actuated by at least one spring 8 and 9 respectively, pressing said respective slide towards the position shown in Fig. 1A. The spring 8 acts a stop 11 provided on the slide 6 and a fixed transverse wall 12 in the housing 5 (see Fig. 1B). The spring 9 acts between a stop on the slide 7 and the rear end wall 5d in the housing 5. In the housing 5 there are two parallel slide bars or guide rods 10a, 10b, on which the slides 6, 7 run.

The front slide 6 may be retained in a withdrawn position by means of a hook provided on a tongue member 14 protruding from the slide, said tongue member engaging the bottom edge of the transverse wall 12. The rear slide 7 may in a corresponding way be hooked and retained in a withdrawn position by means of a hook means 15 protruding from the slide, said means engaging a springy hook member 16 at the rear wall 5d of the housing 5.

The tissue sampling device shown in Fig. 1A-C is loaded and released in the following manner. Fig. 1A shows the unloaded initial position, in which position the slides 6, 7 are being pressed leftwards (to the left) in Fig. 1A, i.e. against the front end wall 5c of the housing 5 and against the transverse wall 12 respectively, by the springs 8 and 9 respectively. The needle assembly 1, in which the inner needle 3 is freely slideable in the hollow outer needle, is placed in its correct position in the housing 5, so that each needle head 2a, 3a follows the movements of the slides 6, 7 respectively. In the shown embodiment this is achieved in that the needle head 2a rests in the generally U-shaped slide 6, and surrounds said slide with a front flange 2d and rear flange (not shown), whereas the needle head 3a is provided with a flange 3d, resting in a transverse recess 7a on the slide 7.

Thus when the needle assembly 1 has been placed in the device, the device is energized in that the slides 6 and 7 are moved simultaneously to the position shown in Fig. 1B by the operator, whereby the springs 8, 9 are compressed and act to return the slides 6, 7 to the initial position (the energizing device itself is not shown in Figs. 1A-C in order that the drawings be clear, but it will be described in connection with Figs. 2 and 3). The slides 6, 7 are retained in the energized position according to

Fig. 1B by means of the above mentioned hook mechanisms 12, 14-16. The needle assembly 1 may now be transferred to the desired sampling position in the body.

When the needle assembly has been positioned at the correct location in the body the sampling is carried out by pressing a release button 18 whereby the engagement between the hook means 15, 16 is interrupted. Because of the biased spring 9, the slide 7 together with the inner needle 3, is pushed to the left towards the initial position. The slide 6, together with the outer needle 2, is still retained in the energized position, whereby the inner needle 3 protrudes from the outer needle, thereby exposing the hollow 3b. This position is shown in Fig. 1C, in which the slide 7 has not fully reached its initial position at the transverse wall 12. Immediately after having reached the position shown in Fig. 1C, the slide 7 impacts and abuts the hook spring 14, and interrupts the engagement of said hook with the transverse wall 12, whereby the spring 8 also pushes back the slide 6 to its initial position according to Fig. 1A. Thereby the outer needle 2 again is pushed over the hollow 3b in the inner needle, thereby cutting the tissue sample that is being collected in the hollow 3b. Thereafter the needle assembly 1 is removed from the sampling device and the sample is analyzed.

Having described the major functions of the sampling device and its cooperation with the needle assembly, a preferred embodiment of the tissue sampling device will now be described in more detail, with reference to Figs. 2 and 3 in the drawings, where corresponding details are provided with the same reference numerals as in Figs. 1A-1C.

Figs. 2 and 3 show a tissue sampling device according to the invention in the position according to Fig. 1A, and for reasons of clarity the needle assembly has been excluded from these figures. It is shown how the housing 5, in addition to the side walls 5a, 5b and the end walls 5c, 5d, is also provided with a bottom 5e and a cover 5f. The latter is openable, so that the needle assembly 1 can be inserted in and removed from the device. For this purpose the cover may rest on the end walls 5c, 5d, as illustrated by the pins 13 in Fig. 2. A cover is conveniently kept in closed position by means of some suitable (not shown) locking mechanism, e.g. a snap-lock. The slide bars 10a, 10b, on which the slides 6 and 7 run, are in the shown embodiment mounted on the end walls 5c, 5d, e.g. by means of screw and gasket, as is illustrated at 17 in Fig. 3, said slide bars having a circular cross-section. The slides 6, 7 are provided with corresponding cooperating means, so that they can be supported by and slide along the slide bars 10a, 10b. It is preferred that the slides 6, 7 for this purpose are provided with through-bores

adapted to the cross-sectional shape of the slide bars 10a, 10b. The arrangement with slide bars common to both slides 6, 7, especially with two parallel slide bars placed on each side of the slides, gives significant advantages, i.e. very good stability and precision when manipulating the needle assembly, only slight wear of the elements of the device etc.

The propelling springs 8, 9 are coil springs, being arranged around the slide bars 10a, 10b respectively, and act as compressive springs, making them develop a very suitable, uniform and symmetric driving force for propelling the slides 6, 7 and the needle assembly 1.

Fig. 3 shows most clearly the preferred design of the spring block 14, here in the shape of a slightly upwardly biased leaf spring, one end of which being shaped as a hook 14a, or forming a functionally analogous stop surface. A spring 14 is attached to the bottom of the slide 6 by means of a screw 19. A transverse wall 12 (which also functions as a bumper for the springs 8) cooperating with a spring 14, is provided with a lower groove 12a, through which the hook 14a passes when the slide 6 is moved backwards on energizing, whereafter said hook is sprung upwards and engages the lower rear edge of the transverse wall 12, thereby preventing the slide 6 from returning to the initial position. The hook 14a is retained in this position until the slide 7 when returning to its initial position impacts the hook 14a pressing it downwards, in such a way that its engagement with the transverse wall 12 is interrupted. Figs. 2 and 3 also show a preferred design of the retaining mechanism for the slide 7. The hook member 15, mounted in the slide 7, has in this embodiment the shape of a frusto-conical head, a straight base edge of which is engageable with the hook mechanism 16, said mechanism being generally L-shaped, and being pivotably journaled on a pivot 20 at its corner, and whereby one leg of said L-shaped element is connected with the release button 18. A bent leaf spring 21 biases the hook 16 upwards (and the release button 18 outwards). When the device is energized the hook 16 retains the slide 7 in an energized position, through engagement with the hook member 15. When performing a sampling the push button 18 is pressed, whereby the hook 16 is moved downwards, so that the engagement with the hook 15 is interrupted and the slide 7 is returned to its initial position.

It is important that rotation of the needle assembly is prevented during sampling, and Figs. 2 and 3 show a special device for preventing rotation of the inner needle 3. As mentioned in connection with Figs. 1A-C the head 3a of the inner needle can advantageously be provided with a flange 3d, engaging a transverse recess 7a on the slide 7. This flange

3d is preferably provided with a slit, cooperating with a guide pin 22, provided in or over said transverse recess 7a. This arrangement prevents undesired rotation of the inner needle 3.

An essential feature of the sampling device according to the invention is that it is provided with an energizing mechanism, biasing both propelling springs 8, 9 simultaneously and without the need of special tools. In the shown preferred embodiment the energizing mechanism comprises an energizing rod 23, running in a longitudinal guide in the housing 5, e.g. in its side wall 5b. The rod 23 is provided with slits 24 and 25, cooperating with protrusions 26 and 27 on the slides 6, 7 respectively. The energizing rod 23 runs through the end wall 5d, forming outside said wall a handle 23a. The operator energizes the sampling device by pulling the handle 23a, whereby the protrusions 26, 27 are brought into engagement with the front edges of the slits 24, 25 respectively, and whereby the slides 6, 7 are moved towards the energized position (Fig. 1B). The slides 6, 7 are locked in this position in that the hook spring 14 is brought into engagement with the transverse wall 12 and in that the spring biased hook 16 engages the hook means 15.

The free end of the handle 23a preferably continues with a second rod-shaped portion 23b, running in one piece in a second longitudinal guide in the housing 5, e.g. the side wall 5a. A return spring 28, acting between the rod element 23b and the housing, returns the energizing mechanism to its initial position, when the slides 6, 7 have been locked still in the energized position. For this purpose the slits 24, 25 are at least as long as the stroke of the slides between the initial position and the energized position. By this return action the handle 23b requires little space during the sampling, and it also enhances security, since the operator can easily control whether the device is energized or not (the return spring (28) has considerably less force than the energizing spring 8, 9).

A tissue sampling device according to the invention is preferably also provided with a securing mechanism, preventing inadvertent release. In the shown embodiment the release button 18 is provided with a groove 29 in the shape of a circular segment, cooperating with a transversely running securing pin 30, which in its turn runs in a corresponding circular transverse bore in the end wall 5d.

The pin 30 is provided with two peripherally located recesses 31 and 32, cooperating with a ball 33 inserted in a bore in the end wall 5d, said ball being pressed against the pin by means of a spring 34. 35 designates a screw, retaining the spring in the bore. The pin 30 is also provided with a third peripherally located recess 36, cooperating with a

groove 29 in the release button 18. In the shown position the ball 33 is engaged with the peripherally located recess 32, said recess 36 at the same time being located immediately above the release button 18, i.e. the pin 30 does not prevent sampling to be carried out by pressing the button.

By pressing the pin 30, inwards, thus overcoming the force from the spring 34, the ball 33 can be brought to a secured position in which it bears against the peripherally located recess 31. In this position there is no recess in the pin at the groove 29 in the release button 18, and thus the pin engages the groove thereby preventing pressing of the button 18 inwards. In this way one can easily and safely switch the sampling device between locked and unlocked position. The pin 30 is suitably arranged in such a way that it in the unlocked position protrudes from the housing 5 on one side (Fig. 2), while its other end protrudes from the opposite side in the locked position. The ends of the pins are preferably provided with different colours on respective protruding ends, e.g. red colour 36 indicating unlocked position and green colour on the opposite end indicating locked position.

The invention can be varied and modified in many ways within the scope of the appended patent claims. One can for example use another number or another type of spring means than those particularly described, and the same applies to many other constructive details, e.g. the different hook mechanisms described.

#### Claims

1. A tissue sampling device comprising a needle assembly (1) with first, inner needle (3) slidably provided within a second hollow outer needle (2), said inner needle being provided with a hollow (3b) near its point for receiving a tissue sample, said device further comprising a housing (5), in which the needle assembly (1) is insertable, a propelling device (9) for propelling the inner needle (3), a propelling device (8) for propelling the outer needle (2), an energizing mechanism for biasing said propelling devices, and a release mechanism operable from the outside of the housing, and adapted to release said propelling devices, said energizing mechanism allowing positioning of and retaining both needles in a withdrawn position from without the needle assembly, said energizing mechanism comprising at least one energizing rod (23) displaceable in the longitudinal direction of the housing (5) and extending through an end wall (5d) thereof, thereby forming a handle (23a) thus enabling said energizing mechanism to be operable from the outside of the housing, said rod (23) being

provided with slits (24, 25) cooperating with protrusions (26, 27) on first and second slides (7, 6) said first (7) and second (6) slides being coupled to said first (3) and second (2) needles respectively and running on guide rods (10a, 10b) located in the housing (5), such that when the energizing rod (23) is moved against the force of the propelling devices, the front edges of said slits (24, 25) become engaged with said protrusions (26, 27) whereby said slides (6, 7) are moved towards the energized position, thus biasing each respective propelling device (8, 9), said first and second slides (7, 6) being retained in their energized position by first (15, 16) and second (12, 14) hook means respectively, and

said release mechanism provides for separate release of the two needles, said release mechanism comprising

at least one biasable spring mechanism (8, 9) for each slide, whereby the bias force constitutes the driving force of the propelling means, the release mechanism further comprising means (18, 20, 16) for interrupting the engagement between said first hooks (15, 16) that retain the first slide (7) in its energized position, and for interrupting the engagement between said second hooks (12, 14) that retain the second slide (6) in its energized position, such that the first slide (7) is released first, and such that the first slide (7) after a predetermined time from its release, acts to release the second hook means (12, 14), thereby causing the second slide (6) to be released from its energized position.

2. The device according to claim 3, wherein there are provided two parallel, spaced apart guide rods (10a, 10b).
3. The device according to any of claims 2 - 3, wherein the spring mechanism of each propelling device comprises at least one spring (8, 9), acting between the respective slides (6, 7) and the housing (5).
4. Device according to claim 4, wherein said springs are coil springs (8, 9) arranged around said guide rods (10a, 10b), at least one of said coil springs (8) being disposed between one (6) of said slides and a transverse wall (12) located in the housing and at least one of said coil springs (9) being disposed between the other (7) of said slides and the rear end wall (5d) of the housing.
5. Device according to either of claims 2-5, wherein the energizing device is provided with

a return spring (28), moving the energizing rod (23) back to its initial position after the biasing of the spring mechanisms (8, 9) has been carried out.

6. Device according to one of the preceding claims, wherein a locking device (29-34), operable from the outside of the housing, and being switchable between a first position in which it locks the release mechanism (18), and a second position in which it unlocks the release device.
7. Device according to either of claims 2-7, wherein at least one of said slides (6, 7) is provided with a guide pin (22) provided in the longitudinal direction of the housing (5), and cooperating with a slit in one of the needles (2, 3) of the needle assembly, for preventing rotation of the needle.

#### Patentansprüche

1. Vorrichtung zur Gewebe-Entnahme mittels einer Nadelanordnung mit folgenden Merkmalen:
  - die Nadelanordnung (1) besteht aus einer ersten, inneren Nadel (3), die in einer zweiten, äußeren, hohlen Nadel (2) verschiebbar ist und nahe ihrem Gewebenaufnahmepunkt eine Auskehlung (3b) aufweist,
  - die Nadelanordnung (1) ist in ein Gehäuse (5) einsetzbar, das eine Vortriebsvorrichtung (9) für die innere Nadel (3) und eine Vortriebsvorrichtung (8) für die äußere Nadel (2), eine Spannvorrichtung für das Vorspannen der Vortriebsvorrichtungen und eine von außerhalb des Gehäuses betätigbare Auslösevorrichtung für die Vortriebsvorrichtungen aufweist,
  - die das Positionieren und das Zurückhalten beider Nadeln in einer zurückgezogenen Stellung von außerhalb des Gehäuses erlaubende Spannvorrichtung umfaßt mindestens einen Spannstab (23), der in Längsrichtung des Gehäuses (5) verschiebbar ist, durch eine das Gehäuse begrenzende Wandung (5d) ragt und außerhalb einen Handgriff (23a) bildet, um die Spannvorrichtung von außerhalb des Gehäuses betätigen zu können,
  - der Spannstab (23) weist Schlitz (24, 25) auf, die mit Vorsprüngen (26, 27) an einem ersten und an einem zweiten Schlitten (6, 7) zusammenwirken, welche jeweils mit der ersten (3) und zweiten (2) Nadel entsprechend gekuppelt sind,

- die Schlitten (6, 7) gleiten auf im Gehäuse (5) angeordneten Führungsstäben (10a, 10b) in der Weise, daß beim Bewegen des Spannstabes (23) gegen die Kraft der Vortriebseinrichtungen die Vorderkanten der Schlitz (24, 25) an den Vorsprüngen (26, 27) zur Anlage gelangen und die Schlitten (6, 7) in die gespannte Position bewegen und dabei die Vortriebseinrichtungen (8, 9) spannen, 5
  - die Schlitten (6, 7) sind in den gespannten Positionen durch erste (15, 16) und zweite (12, 14) Hakenglieder gehalten, 10
  - die ein getrenntes Auslösen der zwei Nadeln ermöglichende Auslösevorrichtung umfaßt mindestens eine spannbare, die Vortriebskraft für die Vortriebseinrichtungen liefernde Federvorrichtung (8, 9) für jeden Schlitten, 15
  - die Auslösevorrichtung umfaßt ferner Mittel (18, 20, 16) für das Unterbrechen des Eingriffs zwischen den den ersten Schlitten (7) in der gespannten Position haltenden ersten Hakengliedern (15, 16) und für das Unterbrechen des Eingriffs zwischen den den zweiten Schlitten in der gespannten Position haltenden zweiten Hakengliedern (2, 4); 20
  - dies alles in derartiger Anordnung, daß bei zuerst erfolgender Freigabe des ersten Schlittens (7) dieser nach einer vorbestimmten Zeit nach seiner Auslösung die zweiten Hakenglieder (12, 14) betätigt, die den zweiten Schlitten (6) aus seiner gespannten Position freigeben. 25
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** im Gehäuse (5) zwei parallel im Abstand voneinander angeordnete Führungsstäbe (10a, 10b) vorgesehen sind. 30
  3. Vorrichtung nach den Ansprüchen 1 und 2, **dadurch gekennzeichnet, daß** die Federvorrichtungen (8, 9) jeder Vortriebsvorrichtung mindestens eine zwischen dem jeweils zugeordneten Schlitten (6, 7) und dem Gehäuse (5) wirksam werdende Feder (8, 9) umfassen. 35
  4. Vorrichtung nach Anspruch 3, **dadurch gekennzeichnet, daß** die Federn als die Führungsstäbe (10a, 10b) umfassende Schraubenfedern (8, 9) ausgebildet sind, und daß mindestens eine Schraubenfeder zwischen dem Schlitten und einer quer im Gehäuse (5) liegenden Wand, und daß mindestens eine Schraubenfeder (9) zwischen dem anderen Schlitten (7) und einer das Gehäuses (5) begrenzenden Wandung (5d) angeordnet ist. 40

5. Vorrichtung nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, daß** der Spannvorrichtung eine den Spannstab (23) nach dem Vorspannen der Federn (8, 9) in seine Ausgangslage zurückbewegende Rückholfeder (28) zugeordnet ist.
6. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, daß** eine von außerhalb des Gehäuses (5) betätigbare Sperrvorrichtung (29 bis 34) vorgesehen ist, die zwischen einer ersten Lage, in der der Auslösemechanismus (18) gesperrt ist und einer zweiten Lage, in der der Auslösemechanismus (18) entsperrt ist, bewegbar ist.
7. Vorrichtung nach einem der Ansprüche 2 bis 6, **dadurch gekennzeichnet, daß** mindestens einer der Schlitten (6, 7) mit einem in Längsrichtung des Gehäuses (5) erstreckenden Führungsstift (22) versehen ist, der zwecks Verhinderung von Drehbewegungen der Nadeln mit einem Schlitz in einer der Nadeln (2, 3) in Wirkverbindung steht.

#### Revendications

1. Dispositif pour prélever des échantillons de tissu comprenant un ensemble d'aiguilles (1) avec une première aiguille interne (3) logée de façon coulissante à l'intérieur d'une seconde aiguille creuse (2), l'aiguille interne étant munie d'un creux (3b) à proximité de sa pointe destiné à recevoir un échantillon de tissu, le dispositif comprenant de plus un logement (5) dans lequel l'ensemble d'aiguilles (1) peut être introduit, un dispositif d'éjection (9) destiné à éjecter l'aiguille interne (3), un dispositif d'éjection (8) destiné à éjecter l'aiguille externe (2), un mécanisme d'excitation destiné à précontraindre les dispositifs d'éjection et un mécanisme de libération pouvant être actionné depuis l'extérieur du logement et apte à libérer les dispositifs d'éjection, le mécanisme d'excitation permettant de positionner et de retenir les deux aiguilles dans une position rentrée de l'ensemble d'aiguilles, le mécanisme d'excitation comprenant au moins une tige d'excitation (23) déplaçable dans la direction longitudinale du logement (5) et s'étendant à travers sa paroi d'extrémité (5d) formant ainsi une poignée (23a) permettant l'actionnement du mécanisme d'excitation depuis l'extérieur du logement, la tige (23) étant munie de fentes (24, 25) coopérant avec des saillies (26, 27) sur des première et seconde glissières (7, 6), les première (7) et seconde (6) glissières étant accouplées respectivement aux première (3) et seconde (2)

- aiguilles se déplaçant sur des tiges de guidage (10a, 10b) situées dans le logement (5) de sorte que lorsque la tige d'excitation (23) est déplacée en opposition à la force des dispositifs d'éjection, les bords avant des fentes (24, 25) viennent en coopération avec les saillies (26, 27) permettant aux glissières (6, 7) de se déplacer sur la position excitée, précontrainant ainsi chaque dispositif d'éjection respectif (8, 9), les première et seconde glissières (7, 6) étant retenues dans leur position excitée par des premiers (15, 16) et seconds (12, 14) moyens de crochet respectivement et le mécanisme de libération assurant la libération séparée des deux aiguilles, le mécanisme de libération comprenant au moins un mécanisme de précontrainte à ressort (8, 9) pour chaque glissière, la force de précontrainte constituant la force d'entraînement du moyen d'éjection, le mécanisme de libération comprenant de plus des moyens (18, 20, 16) pour interrompre l'engagement entre les premiers crochets (15, 16) qui retiennent la première glissière (9) dans sa position excitée, et pour interrompre l'engagement entre les seconds crochets (12, 14) qui retiennent la seconde glissière (6) dans sa position excitée, de sorte que la première glissière (7) est libérée d'abord et en ce que la première glissière (7) après un temps prédéterminé à partir de sa libération agit pour libérer les seconds moyens de crochet (12, 14) provoquant ainsi la libération de la seconde glissière (6) de sa position excitée.
2. Dispositif selon la revendication 3, dans lequel sont prévues deux tiges de guidage espacées parallèles entre elles (10a, 10b).
3. Dispositif selon l'une quelconque des revendications 2 - 3, dans lequel le mécanisme à ressort de chaque dispositif d'éjection comprend au moins un ressort (8, 9) agissant entre les glissières respectives (6, 7) et le logement (5).
4. Dispositif selon la revendication 3, dans lequel les ressorts sont des ressorts hélicoïdaux (8, 9) disposés autour des tiges de guidage (10a, 10b), au moins l'un des ressorts hélicoïdaux (8) étant disposé entre l'une des glissières (6) et une paroi transversale (12) située dans le logement et au moins l'un des ressorts hélicoïdaux (9) étant disposé entre l'autre des glissières (7) et la paroi d'extrémité arrière (5d) du logement.
5. Dispositif selon l'une ou l'autre des revendications 2-4, dans lequel le dispositif d'excitation est muni d'un ressort de rappel (28) ramenant la tige d'excitation (23) sur sa position initiale après la mise en précontrainte du mécanisme à ressort (8, 9).
6. Dispositif selon l'une des revendications précédentes, dans lequel un dispositif de blocage (29, 34) peut être actionné depuis l'extérieur du logement et peut être commutable entre une première position dans laquelle il bloque le mécanisme de libération (18) et une seconde position dans laquelle il débloque le mécanisme de libération.
7. Dispositif selon l'une ou l'autre des revendications 2-6, dans lequel au moins une des glissières (6, 7) est munie d'une goupille de guidage (22) montée dans la direction longitudinale du logement (5) et coopérant avec une fente dans l'une des aiguilles (2, 3) de l'ensemble à aiguilles pour empêcher la rotation de l'aiguille.



Fig. 1A

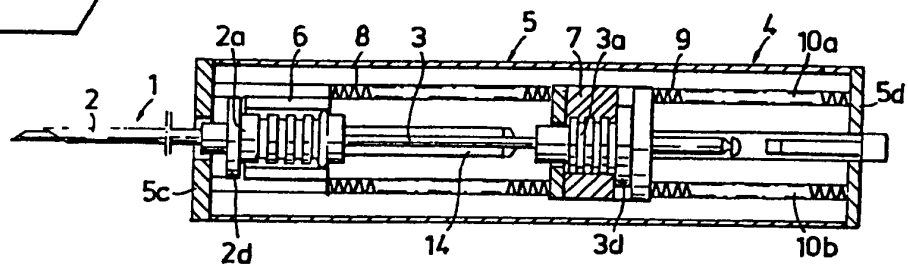


Fig. 1B

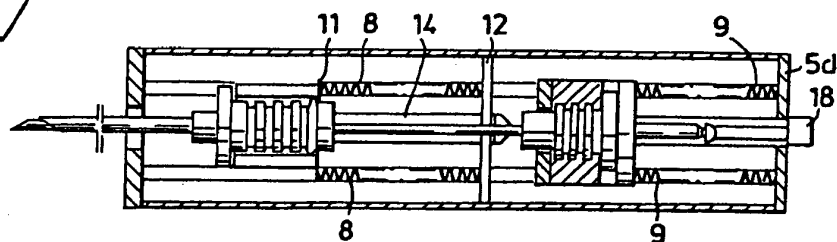


Fig. 1C

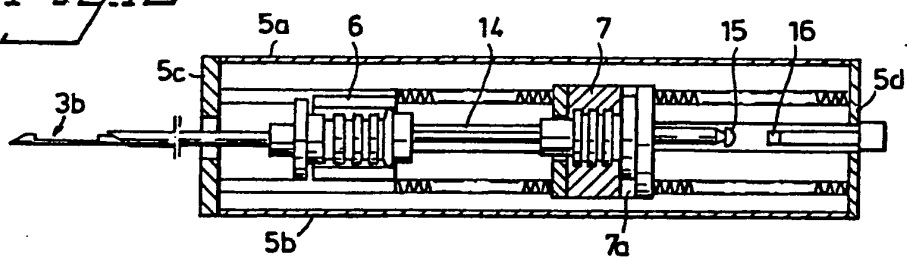


Fig. 2

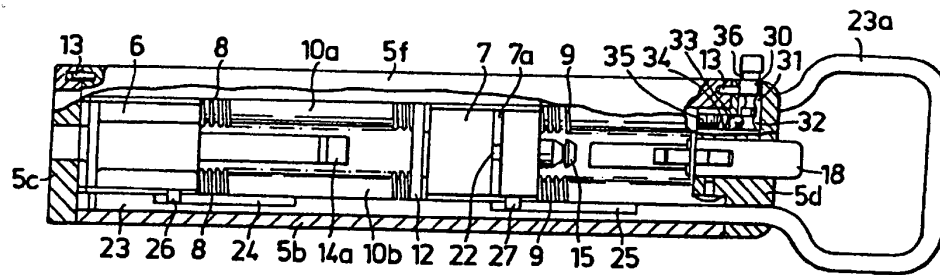
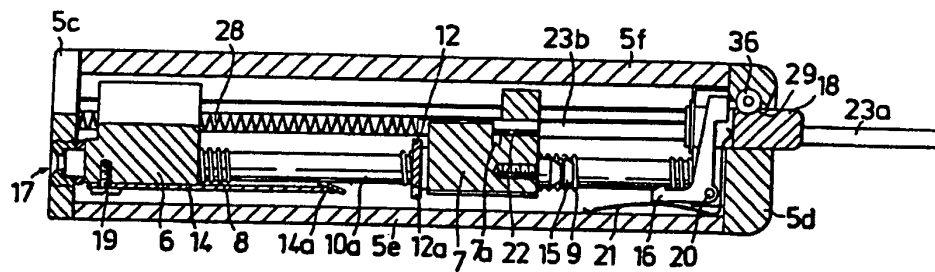


Fig. 3





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## EUROPEAN SEARCH REPORT

Application number

EP 87 85 0043

| DOCUMENTS CONSIDERED TO BE RELEVANT   |   |  |   |
|---|---|--|---|
| Category  | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim  | CLASSIFICATION OF THE APPLICATION (Int. Cl.4) |
| Y   | EP-A-0 153 047 (D.W.BERAHA)<br>* Figure 7; page 10, lines 1-12 *              | 1-5  | A 61 B 10/00                                  |
| Y   | WO-A-8 303 343 (RADIPLAST)<br>* Figures 1-3; claim 1 *                        | 1-5  |   |
|   |   |  | TECHNICAL FIELDS SEARCHED (Int. Cl.4)         |
|   |   |  | A 61 B<br>A 61 M                              |
| The present search report has been drawn up for all claims  |   |  |   |
| Place of search<br>THE HAGUE  |   | Date of completion of the search<br>26-05-1987   | Examiner<br>ARGENTINI A.                      |
| <b>CATEGORY OF CITED DOCUMENTS</b>  |   |  |   |
| X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |   | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |   |